

Clinton Landfill 3

Site Summary

Clinton, Illinois
DeWitt County
Illinois EPA 0390055036
Champaign Region

Site Description

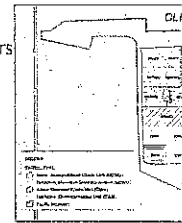
(<http://www.epa.state.il.us/community-relations/fact-sheets/clinton-3/figure-1-clinton-landfill.gif>)

Total Acreage: 266.5
Congressional District 13
House 101 / Senate 51

NOTE: Definitions for the italicized words listed here are included in the Glossary .

(<http://www.epa.state.il.us/community-relations/fact-sheets/clinton-3/figure-1-clinton-landfill.gif>) Clinton Landfill 3 is located in unincorporated DeWitt County, approximately 1¼ miles south of the City of Clinton. The facility covers 266.5 acres and has a total waste disposal area of 157.5 acres. When filled to its permitted design capacity, the maximum height of the landfill will be approximately 150 feet above the surrounding topography. The landfill is owned and operated by Clinton Landfill, Inc., which is part of the PDC/Area family of companies.

Clinton Landfill 3 consists of two parts: the 135-acre Municipal Solid Waste Unit (MSWU) and the 22.5-acre Chemical Waste Unit (CWU). [See Figure 1.] The waste capacity of the MSWU is approximately 29 million cubic yards and the waste capacity of the CWU is approximately 2.5 million cubic yards.



Site History

In March 2007, the Illinois EPA's Bureau of Land (BOL) issued the original development permit for Clinton Landfill 3 approving the development of a non-hazardous waste landfill. When constructed and permitted for operation, this landfill would be allowed to accept municipal solid waste and non-hazardous special waste. A permit allowing waste disposal to begin in the MSWU was issued in September 2008 and, as of December 2014, approximately 33 acres of the MSWU have been permitted for waste disposal.

In January 2010, BOL issued a permit approving a redesign of 22.5 acres in the southwest corner of Clinton Landfill 3 which subdivided into the MSWU and the CWU and included additional environmental safeguards for the CWU. The permit issued in January 2010 also gave approval for two new non-hazardous special wastes to be disposed of in the Chemical Waste Unit: 1) manufactured gas plant (MGP) waste and 2) polychlorinated biphenyl (PCB) wastes, requiring approval by the Toxicity Characteristics Leaching Procedure (TCLP) thresholds, and 2) polychlorinated biphenyl (PCB) wastes, requiring approval by the federal Toxic Substances Control Act (TSCA).

Waste disposal in the CWU was permitted to begin in April 2011 and, as of December 2014, approximately 6 acres of the CWU have been permitted for waste disposal. On July 31, 2014, Illinois EPA's Bureau of Land, Permit Section issued a permit (Modification No. 47) disallowing the above described PCB wastes and MGP wastes in the Chemical Waste Unit.

Status of Request with US EPA to Accept PCB Waste

Polychlorinated biphenyl (PCB) wastes are regulated under the federal Subpart D of 40 CFR 761 regulations, which were promulgated under the federal Toxic Substances Control Act (TSCA). The USEPA administers the TSCA program directly and the disposal of some types of PCB wastes requires prior approval from the US EPA.

In October 2007, the operator of Clinton Landfill 3 submitted an application to USEPA Region 5 in Chicago requesting to be allowed to accept PCB waste in Clinton Landfill 3's CWU. On August 13, 2014, USEPA Region 5 announced, "In light of the Illinois EPA's recent permit modification for Clinton Landfill [i.e., Modification No. 47], the U.S. Environmental Protection Agency does not intend to proceed at this time with a decision on Clinton Landfill's application to accept polychlorinated biphenyl (PCB) waste."

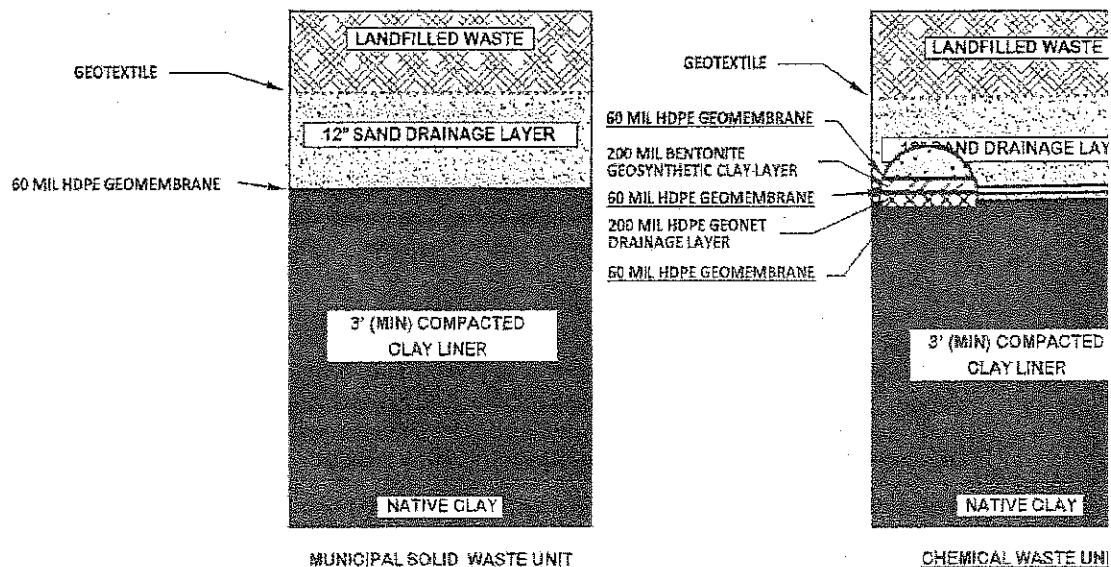
Illinois EPA's Experience in Testing Groundwater for PCBs

Starting in 1984, Illinois EPA began sampling all the Community Water Supply (CWS) wells across the state for PCBs, along with a suite of other parameters. As of June 2013, PCBs have never been confirmed to be present in any CWS on a state-wide basis, the Mahomet Aquifer System, or the Clinton CWS wells as documented in this groundwater monitoring fact sheet.

Design of MSWU's Liner and Leachate Drainage System

The design of the liner and leachate drainage systems for the MSWU is one that is frequently used at non-hazardous waste landfills in Illinois. Starting from the bottom and going up, the liner consists of a layer of compacted clay three feet thick overlain by a 60-mil high density polyethylene (HDPE) geomembrane. The purpose of the liner is to stop leachate from migrating out of the waste and into the surrounding environment. On top of the liner is the leachate drainage layer which consists of a one foot layer of sand overlain by a geotextile. The sand layer, in conjunction with a network of pipes known as the leachate collection system, is to prevent the height (or head) of liquid standing on the liner from exceeding one foot. The pipes conduct the leachate to a sump where it is pumped out of the landfill, into a water body, and, ultimately, either solidified and placed back into the landfill or trucked off-site for treatment. The geotextile on top of the sand acts as a filter to prevent clogging by keeping fine particles out of the sand layer.

CLINTON LANDFILL NO. 3 - TYPICAL FLOOR LINER SECTION



(<http://www.epa.state.il.us/community-relations/fact-sheets/clinton-3/test-Sections2.gif>)

CWU Design's Additional Environmental Safeguards

The design for the CWU, which was approved in the permit issued by the Illinois EPA BOL in January 2010, exceeds the requirements for leachate drainage systems in the non-hazardous waste landfills in Illinois. This design includes the same four layers of materials, that is, MSWU's liner and leachate drainage systems, but it also includes an additional four layers.

Under CWU design, again starting at the bottom, there is a three foot layer of compacted clay and a 60-mil HDPE geomembrane. These constitute the secondary liner. On top of the secondary liner, there is a 200-mil HDPE geonet that serves as the secondary leachate drainage system. On top of the geonet is a 200-mil bentonite geosynthetic clay liner (GCL) sandwiched between two layers of 60-mil HDPE geomembrane/GCL/geomembrane sandwich serves as the primary liner system. Finally, on top of the primary liner system is the primary leachate drainage system composed of a foot of sand overlain by a geotextile.

One of the advantages of the CWU design over the MSWU design is the redundancy provided by the secondary liner. That is, if the primary liner system were to leak, the secondary liner is there to back it up to prevent leachate from escaping into the environment. Also, if leachate constituents were found in the secondary leachate drainage system, that would provide an early warning that the primary liner system was failing. For this reason, the secondary leachate drainage system is sometimes called the witness zone.

Groundwater Monitoring at Clinton Landfill #3

At Clinton Landfill 3, the groundwater flows generally from north to south, so the *background wells* are on the north side of the landfill. There are four separate groundwater units at Clinton Landfill 3 and each unit has its own set of monitoring wells. The Mahomet Aquifer System is located across central Illinois and is located much deeper than these groundwater units. At the Clinton Landfill 3 location the groundwater flow is generally from the southeast to the northwest.

Currently, there are a total of 15 *upgradient monitoring wells* and 39 *downgradient monitoring wells* that monitor the groundwater at MSWU and the CWU of Clinton Landfill 3. All of these groundwater monitoring wells are sampled and analyzed for 71 organic parameters a year, and for 14 inorganic parameters, four times a year. The groundwater monitoring wells located downgradient of the CWU are also analyzed for an additional 21 organic parameters two times a year. In addition to the groundwater monitoring wells, there are 12 *piezometers* at the landfill.

Clinton Landfill 3 uses background levels taken from analytical results from their upgradient monitoring wells over a one year period. The calculated *Applicable Groundwater Quality Standard* or AGQS value is the background value for each parameter at the facility. At Clinton Landfill 3 the *Maximum Allowable Predicted Concentration* or MAPC value is equal to the AGQS value. In a situation like this, the background level is referred to as AGQS/MAPC values.

Typically, the background level for any given chemical in a monitoring well is far lower than the Illinois *Class I Groundwater (drinking water) Standard*. As an example, the Illinois Class I Standard for dissolved chloride is 200 mg/L (parts per million), a level that is much greater than the background value for chloride at Clinton Landfill 3, where the AGQS/MAPC values for dissolved chloride are 8.5 mg/L, 51.8 mg/L, 33 mg/L in each of the 4 separately monitored units at the facility.

The Groundwater Sampling and Analysis Plan for Clinton Landfill 3, which is contained in the *permit record*, includes specifications for groundwater monitoring program personnel and responsibilities, 2) field sampling equipment and procedures, 3) laboratory analytical procedures, 4) project quality assurance, and 5) data analysis and reporting. All of the elements of the Groundwater Sampling and Analysis Plan were reviewed and approved by the Illinois EPA as part of the process of reviewing the original development permit application, which was ultimately issued in 2007, and subsequent permit applications. The Groundwater Sampling and Analysis Plan has been determined by EPA to be adequate to meet applicable regulatory requirements and guidance, and conform to best management practices (e.g., the applicable *Methods*).

At the present time, all of the wells at the Clinton Landfill 3 are in routine *detection monitoring*. None of the facility's monitoring wells are currently in *assessment monitoring* and no *groundwater remedial actions* are being performed at the facility. The groundwater and leachate monitoring data for Clinton Landfill 3 (<http://www.epa.illinois.gov/topics/community-relations/sites/clinton-landfill-3/groundwater-leachate-monitoring/index>) are now online, starting with the second quarter of 2013.

Illinois EPA's Inspections of Clinton Landfill 3

The Illinois EPA's Champaign field office is responsible for the inspections of the Clinton landfill. Unannounced inspections are conducted every two months. Inspections were conducted on January 18, 2013, April 16, 2013, June 10, 2013, August 29, 2013, October 9, 2013, December 9, 2013, February 18, 2014, April 1-2, 2014, April 28, 2014, August 14, 2014, October 20, 2014, and February 18, 2015. The purpose of the inspection is to verify that the landfill is operating in compliance with the permit that has been issued and State laws and regulations that apply to landfills. The active waste disposal portion of the landfill is examined to verify proper operation. The records that are required to be kept are reviewed during the inspection. An overall site survey is conducted looking for problem areas that could manifest into problems so that preventative steps can be taken. In particular, the methane gas collection and control system, leachate collection and storage tanks, storm water management structures, dust control, litter collection, mud tracking, inspection of loads of waste and the groundwater monitoring wells are inspected. If issues or problems are found during the inspection, they are discussed with the site manager before the inspection is concluded.

In addition to the bi-monthly inspection, additional visits to the landfill are made by the field office upon request by the Agency's permit engineer. Typically, the field staff verifies that the proper construction activities have been completed and reports that information to the permit engineer in advance of an approval of a permit modification.

Overview of BOL Permit Process for Solid Waste Landfill

For a person or company that wants to operate a new landfill, the first step is to obtain *local siting* approval. The next step is to obtain a *development permit* from the Illinois EPA's Bureau of Land (BOL), as well as permits from the Illinois EPA's Bureau of Water and the Illinois EPA's Bureau of Air. The BOL development permit forms the basis for the landfill's *BOL permit record*. Any change to the BOL permit record is made through subsequent permits called *significant modifications*. After a phase has been constructed, the operator of the landfill must apply for and receive an *operating permit*, a special type of significant modification, before waste can be disposed in the new phase. BOL development permits are issued for 5-year terms and must be renewed through applications for *permit renewal*.

The *BOL permit record* specifies the maximum extent, horizontally and vertically, to which waste may be disposed in the landfill. When the waste disposal is completed, the landfill operator must close the landfill out in accordance with its closure plan. When closure has been completed, the landfill operator submits an affidavit certifying completion of closure and construction documentation to the Illinois EPA for approval through the permit process.

After closure has been completed, the landfill operator must provide *post-closure care* for the landfill. The default minimum post-closure care period for a municipal solid waste landfill is 30 years. When the minimum post-closure care period has been reached, the landfill operator must submit an affidavit certifying completion of post-closure care to the Illinois EPA. If there is no evidence that the landfill is causing environmental problems, the Illinois EPA must approve the affidavit certifying completion of post-closure care and the BOL permit process for the landfill comes to an end.

The regulations specify that within 180 days after receiving an application for a development permit for a new landfill, the Illinois EPA must take final action on it (i.e., either approve or deny it) unless the applicant extends the review period. The regulatory deadline for taking final action on other types of permit applications for nonhazardous waste landfills is 90 days. When defects are found in a permit application, the Illinois EPA sends the applicant's consultant a draft denial letter describing the defects. The applicant then has the option of asking for a final denial letter to be appealed to the Illinois Pollution Control Board or providing an addendum to the application addressing the defects. If the applicant chooses to submit an addendum, oftentimes they also need to extend the review period so the consultant has time to prepare the addendum. The Illinois EPA has time to review it. If an addendum corrects all the defects in an application, the Illinois EPA must approve the permit. If, in responding to an addendum that does not fully address all the remaining defects in an application, the Illinois EPA assesses whether the applicant's efforts seem to be progressing toward an approvable application. If acceptable progress is being made, another draft denial letter is issued.

No more than three days before submitting a permit application to BOL, the landfill operator is required to notify the State's Attorney, the Chairman of the County Board of the county in which the subject landfill is located and each member of the General Assembly from the district in which the landfill is located and the clerk of each municipality any portion of which is within three miles of the landfill.

Overview of Groundwater Procedures at Solid Waste Landfills

The Illinois regulations for landfills go beyond the goal of protecting human health. Existing regulations use *background* levels to support "non-degradation" of existing groundwater quality. These background levels are collected from multiple upgradient monitoring wells, over a one or two year period and the values are statistically evaluated to reflect groundwater quality over the entire facility and for each monitoring well. Once developed, these values are used to establish the permitted *Applicable Groundwater Quality Standard* (AGQS) or the *Maximum Allowable Predicted Concentration* (MAPC) values. Unless different background concentration levels are established and used as the permitted groundwater parameter concentration levels in the facility permit. Typically, the established AGQS or MAPC level for a given chemical in a monitoring well is far below the *Illinois Class I Groundwater (drinking water) Standard*.

When groundwater monitoring data for a landfill show that chemical concentrations exceed the AGQS value at the outer edge of the *Zone of Attenuation* (ZOA), or the MAPC within the ZOA, the State of Illinois' regulations and the landfill's permit require the landfill operator to report the exceedance and, if necessary, to develop and implement groundwater corrective action. The MAPC value is calculated from the AGQS value and acts as an early warning limit at the mid-point of the ZOA or 50 feet from the facility waste boundary. While the AGQS and MAPC are different values, it is not uncommon for a facility to have MAPC values equal to their AGQS values, as is the case with Clinton Landfill 3.

All monitoring wells at the landfill are sampled four times a year (every three months or quarterly). If any monitoring well shows exceedance levels specified in the permit conditions for any chemical it is referred to as an *observed increase*. Illinois regulations require the landfill operator to sample and confirm that the exceedance is real, and is referred to as a *confirmed increase*. It is important to understand that, under Illinois regulations, an exceedance is not the same as a violation, and an exceedance is not by itself proof of contamination from the landfill. If an exceedance is confirmed to be real, the landfill must submit an application for a significant permit modification to address the exceedance.

The significant permit modification application can either: 1) propose to demonstrate that an alternate source (not the landfill) is responsible for the exceedance, or 2) propose Groundwater Assessment Monitoring to determine the source of the exceedance. If the Agency approves the *Alternate Source Demonstration*, the monitoring well returns to routine detection monitoring. Otherwise, the Agency requires the landfill operator to implement *Groundwater Assessment Monitoring* to determine the source of the exceedance, and submit follow-up assessment monitoring reports. If the groundwater assessment monitoring shows a release from the landfill, the landfill must propose and carry out a *Groundwater Corrective Action* plan. The landfill is then required to submit regular Corrective Action Reports.

If an upgradient well shows an exceedance, the landfill is not the likely source of the exceedance, since the direction of groundwater flow is away from the landfill. The landfill still has to go through the reporting procedures described above, as in any other confirmed exceedance. In general, an exceedance in an upgradient well indicates a change in the naturally occurring groundwater conditions. It is then necessary to gather additional data. Quarterly sample results from those upgradient wells to perform standard statistical tests (approved by Illinois EPA and US EPA) that provide an accurate estimate of those naturally occurring levels. When enough data points are gathered - a minimum of four quarters of data (on

new background level may be proposed in a significant permit modification, based on those statistical tests. If Illinois EPA technical experts determine that the analysis and calculations are correct, the permit conditions are modified to reflect the new background level for that chemical groundwater unit.

If permit conditions are modified to set new background levels for a given chemical, those new levels would apply to all the monitoring same monitored groundwater unit, both background wells and those downgradient or side-gradient wells that look for potential releases from the landfill. In such a case, the Agency would consider any previous readings for that chemical that had exceeded the original permit conditions to not exceed the newly set permit conditions to have been addressed acceptably.

Glossary

Alternate Source Demonstration is an attempt to prove that a source other than the landfill is responsible for Observed Increase or the Increase in the groundwater quality. This demonstration must be submitted to the Illinois EPA as a permit application.

Applicable Groundwater Quality Standard or AGQS is the statistically determined background value of a chemical parameter for which samples are analyzed as part performing groundwater monitoring for nonhazardous waste landfills in Illinois. If the groundwater monitoring show that an AGQS value has been exceeded at the outer edge of the ZOA, the landfill operator must investigate the exceedance and, must develop and implement groundwater corrective action.

Assessment Monitoring collects information necessary to ascertain the nature and extent of the groundwater contamination as part of investigation to determine whether the landfill is the source of a groundwater exceedance. The scope of this investigation is proposed landfill operator in a permit application, and at a minimum must include more frequent sampling of the well(s) where confirmed exceedance occurred and more frequent sampling of any surrounding wells. The landfill operator is also required to sample for the parameters of Illinois Class I Groundwater Standard parameters and for federal USPEA parameter lists. The placement of additional monitoring wells necessary to determine the source and extent of contamination. The operator has a specific time frame in which to conduct Assessment and submit an analysis of the investigations results to the Illinois EPA for review and approval.

Background is the concentration of any parameter in groundwater that has not been affected by the facility, but also reflects the naturally occurring fluctuations in parameter concentrations. Statistical analysis of results from all the background wells (upgradient monitoring) to set the initial groundwater parameter levels in the facility permit.

Class I Groundwater (drinking water) Standard is the concentration of any specific parameter listed by the state as the groundwater quality standard for a potable (drinkable) water source. These standards are considered the minimum for safe drinking water in the state of Illinois.

Closure is done after waste disposal at a landfill has stopped and typically consists of constructing the final cover system and establishing on top, as well as completing construction of any environmental safeguards that will be needed during post-closure care that have not been installed (e.g., the final phase of the gas collection system). After the Illinois EPA approves certification of completion of closure, the operator no longer needs to provide financial assurance for closure.

Confirmed Increase is a change in groundwater quality, documented by a second sampling event, in which: 1) the AGQS value for a given parameter has been exceeded at the outer edge of the ZOA, 2) the MAPC value for a parameter has been exceeded at the midpoint between the boundary and the outer edge of the ZOA, or 3) the concentrations for a parameter have shown a progressive increase over eight consecutive quarterly monitoring events. When there is a confirmed increase, the landfill operator must take additional groundwater samples with the original sampling event and submit this information to the Illinois EPA within 180 days after the original sampling event.

Detection monitoring is the routine groundwater monitoring program in which groundwater samples are collected quarterly to monitor groundwater quality at the facility.

[BOL] Development Permit is a permit from the Illinois EPA's Bureau of Land that the operator of a proposed new landfill must obtain before constructing the landfill. The information that must be provided in an application for a BOL development permit for a new non-hazardous landfill includes: 1) proof of local siting approval, 2) a demonstration that the landfill meets the location standards (e.g., it is not within a year floodplain or too close to an airport or homes, etc.), 3) detailed designs for the landfill's environmental safeguards (i.e., the liner, leachate drainage, collection and management systems, final cover system, surface water control structures, and leachate, gas and groundwater monitoring programs), 4) construction quality assurance programs for the environmental safeguards, 5) a detailed description of the landfill operating procedures, 6) a demonstration that the landfill passes the *groundwater impact assessment* or (GIA), and 7) plans and cost estimates for closure and post-closure care of the landfill.

Downgradient Monitoring Wells are placed at locations where groundwater could be affected by the landfill. They are intended to detect releases of contaminants from the landfill into the groundwater before the contaminant plume has migrated off-site. Levels of chemicals in these wells are compared to the levels in the background wells to determine whether any chemicals are present at significantly higher levels than background.

Exceedance, also called an observed increase, in groundwater quality has occurred when routine quarterly groundwater analytical results show: 1) at the outer edge of the ZOA, the concentrations for a given parameter are greater than the facility's AGQS value, 2) at the midpoint between the waste boundary and the outer edge of the ZOA, the concentrations for a given parameter are greater than the facility's MAPC value, or 3) the concentrations for a parameter have shown a progressive increase over eight consecutive quarterly monitoring events. Exceedances become confirmed increases if the data are reaffirmed by additional testing and analysis.

Groundwater Corrective Action or Groundwater Remedial Action is the work done to clean up contaminated groundwater or to prevent contaminated groundwater from migrating offsite. The landfill operator must perform groundwater corrective action if, through assessment and monitoring, the groundwater is determined to have been contaminated by the landfill.

Groundwater Impact Assessment or GIA uses a contaminant transport model to predict the impact that a landfill is likely to have on groundwater quality, taking into account landfill's hydrogeologic setting and its design. To pass the GIA, the modeling must show that, 100 years after the landfill is closed, the concentrations of all parameters monitored in groundwater will not be greater than the facility's background (AGQS) value at the outer edge of the zone of attenuation.

Leachate is liquid, primarily water, that has been in direct contact with waste. In its contact with waste, leachate often picks up contaminants. Therefore, if leachate is not properly controlled, it may contaminate groundwater or surface water.

Local Siting is approval from a local unit of government for a prospective landfill. Local siting must be obtained for a proposed landfill application for a development permit is submitted to the Illinois EPA's Bureau of Land. If the potential landfill is in an incorporated area, approval is granted by the government of the municipality where it is located. Local siting for a proposed landfill in an unincorporated area is obtained from the county board of the county in which the landfill is located. The local siting process takes between approximately one year and a year and a half. A public hearing must be held as part of it.

Maximum Allowable Predicted Concentration - MAPC value is a limit, calculated from the AGQS value of for each chemical parameter. When groundwater is analyzed, in the middle of the zone of attenuation (i.e., at either 50 feet from the facility waste boundary or the midpoint between the waste boundary and the facility's property boundary). If the groundwater monitoring data show that an MAPC value for a parameter has been exceeded in the middle of the ZOA, a type of observed increase to groundwater quality has occurred. MAPC values are usually greater than the AGQS counterpart but it is not too uncommon for the MAPC values to be equal to the AGQS values.

Observed Increase, also called an exceedance, in groundwater quality has occurred when routine quarterly groundwater analytical results show: 1) at the outer edge of the ZOA, the concentrations for a given parameter are greater than the facility's AGQS value, 2) at the midpoint between the waste boundary and the outer edge of the ZOA, the concentrations for a given parameter are greater than the facility's MAPC value, or 3) the concentrations for a parameter have shown a progressive increase over eight consecutive quarterly monitoring events. Observed increases become confirmed increases if the data are reaffirmed by additional testing and analysis.

[BOL] Operating Permit is a permit from the Illinois EPA's Bureau of Land that the operator of a non-hazardous waste landfill must obtain before beginning waste disposal operations in a new phase of the landfill (i.e., placing waste on newly constructed liner). The applications for operating permits must include documentation that all the environmental safeguards (e.g., the liner, leachate drainage and collection systems, groundwater and gas monitoring points) for the new phase have been installed in accordance with the designs approved in the development permit. As part of processing applications for operating permits, an inspection is performed by the Illinois EPA's Field Operation Section, or the county, to confirm that the new phase has been constructed as portrayed in the application. Operating permits are only issued if: 1) the county determines that the new phase has been constructed in accordance with the designs approved by the development permit based on the construction documentation and completion of the site inspection, and 2) the landfill operator has posted financial assurance with the EPA in an amount sufficient to hire a contractor to close the new phase and to provide post-closure care for it.

[BOL] Permit Record is the commitments made in the original BOL development permit as modified by any subsequent permit modification. The permit record includes all permit conditions imposed by the Illinois EPA.

Permit Renewal extends the term of a landfill's permit another 5 years. The applications for permit renewal must include updated GIA map based on a recent survey showing the landfill's current state of development, and new cost estimates for closure and post-closure care.

Piezometers are wells that are used to measure groundwater elevation (i.e., the water table) to help determine the direction and rate of groundwater flow. Groundwater samples are not usually collected from piezometers.

Post-Closure Care is performed by the landfill operator after closure has been completed and consists of: 1) maintaining the final cover, 2) collecting and managing leachate and landfill gas, 3) monitoring leachate, gas and groundwater, and taking necessary groundwater or gas remedial actions.

Significant Modification is a permit that approves changes to a landfill's permit record.

Upgradient Monitoring Wells, also known as "background" wells, are placed at locations where groundwater is flowing toward the landfill. They measure the naturally occurring groundwater conditions which are unaffected by the landfill. They also measure the chemistry of groundwater that is moving toward the landfill. Groundwater chemistry has naturally occurring fluctuations, so statistical analysis of results from all background wells is used to set the initial target levels in the permit conditions for each background well. The target level for each well is set to reflect the existing background conditions in the groundwater unit that is measured by that well.

Uppermost Aquifer means the first geologic formation above or below the bottom elevation of a constructed liner or wastes, where no present, that is an aquifer, and includes any lower aquifer that is hydraulically connected with this aquifer within the facility's permit

Zone of Attenuation or ZOA is a three dimensional region that extends vertically from the top of the ground surface to the bottom of an aquifer. In the horizontal plane, the ZOA extends outward 100 feet from a landfill's waste boundary or to the facility property line, whichever is closer. The waste volume is encompassed by the ZOA but excluded from it. The outer edge of the ZOA is the point of compliance with groundwater quality. Thus when groundwater monitoring data for a landfill show that chemical concentrations exceed the background outer edge of the ZOA, the State of Illinois' regulations and the landfill's permit require the landfill operator to investigate the exceed, necessary, to develop and implement groundwater corrective action.

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